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ABSTRACT

Kudzu (Pueraria lobata) is a high climbing, exceedingly vigorous vine with twining stems (no tendrils or aerial holdfasts). The plant, introduced from the Orient and currently found in southeastern United States, has been known to choke valuable strands of trees, short electrical wires, and even creep up the sides of high rise buildings. Although considered to be a pest, the plant is useful in holding erosional areas that are too steep to seed. In addition, it is a legume and can be considered a green manure crop adding nitrogen to the soil, thus aiding its fertility. This unit provides: (1) list of objectives; (2) list of 9 activities; (3) list of three values clarification activities; (4) background information on the plant (including characteristics of the plant and directions for planting it to obtain the best yield); and (5) procedures for two laboratory activities. These laboratories are designed to determine whether or not various weed killers are effective on cultivated kudzu (and at what strengths) and to investigate the percentage of vegetative growth from the plant's nodes and internodal areas. (JN)

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Kudzu

Wonder Weed

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KUDZU--WONDER WEED

BEHAVIORAL OBJECTIVES:

1. To understand growth patterns as demonstrated by written explanation.

2. To recognize and identify the plant and its growth modes. This is a laboratory practical-type exercise.

3. To understand the control technology as evidenced through the laboratory exercise and verbal explanation.

4. To determine and state in writing the concept of "introduced pest."

5. To understand the reasons for use as evidenced by an essay defending the process of planting as encouraged by Cope.

ACTIVITIES:

1. Grow kudzu in the lab and try various chemical controls (Lab 1).

2. Try experiments (Lab 2) on vegetative growth.

3. Map kudzu in the school feeder area. Use a detailed map.

4. Research the effects on farms in this area.

5. Check into the economic effects of kudzu, check electric utilities' cost, homeowners' cost, etc.

6. Are there or should there be a legal control over the spread on kudzu today?

7. Research and write a theme on "PLANTS GONE WILD."

8. What are the reasons that the deep South planted the vine? Were these justifiable?

9. Have a lab on the botanical aspects of the plant--just observe, leaves, flowers, seeds, seed pods, etc.

VALUES CLARIFICATION ACTIVITIES:

1. Shield of life. Design a "coat of arms" for Kudzu--keep in mind what coats of arms show--origin, family accomplishment, aspirations, ambitions, etc. Divide your shield into four parts, each one should represent an aspect of the plant.

2. Answer the questions:

Why was kudzu used in the first place?

What have been the effects of use?

Could something have been better?

What would happen ecologically if we were to destroy kudzu with pesticides, etc.?

3. List the problems to the removal of kudzu. Rank them from largest (number 1) to the smallest.

Background Data

As the story goes, back around the turn of the century, there was a farmer named C. E. Pleas who lived in Chipley, Florida. Mr. Pleas obtained this innocuous looking plant believing the oriental import would climb his trellis and provide him surcease from the hot Florida sun. When it failed to behave as he had hoped, he pulled it up and tossed it on the garbage pile. There it took root and grew and grew and grew...and grew...and grew some more.

This is the legend of kudzu (Pueraria lobata) the vine that is eating the South.

Three-quarters of a century after Pleas discarded his single plant it remains alive and troublesome. It chokes valuable stands of trees, shorts electrical wires, and even creeps up the sides of of Atlanta's high rise buildings.

James Dickey wrote a poem about kudzu. It goes:
In Georgia, the legend says that you must close your windows at night to keep it out of the house. The glass is tinged with green, even so.

Mr. Pleas shipped some of his friends a few tendrils of kudzu. It seems that he had discoverd the cows had a taste for the succulent leaves and vines of the

plant. Some of his friends were in the soil conservation service and they found that the plant would prevent erosion if planted on the cuts of new highways and railroads.

Ollive Reeves, Georgia's poet laureate wrote "The Song of the Kudzu Vine." In part it goes:

Oh you may have watched the black snake run; To the shady hole from the blistering sun...; But until you've watched Kudzu grow; You've never seen the fastest show.

Pleas cannot be located to defend his role in the spread of kudzu. But this is not really the issue. The issue is how many acres of kudzu are out there today? The answer seems to be "more than last year."

Ridding the clutter of the vine is expensive and time-consuming. Electric utilities from Virginia to Louisiana spend thousands of dollars each year combating this weed.

According to Gayle A. Buchanan, Professor of Agriculture at Auburn University, eradication is impossible. Control is a much better word, and even this is becoming harder and harder each year.

Mr. Channing Cope, Farm Editor of the Atlanta Constitution back in the forties when the "Miracle Vine" was still in good repute, calculated that a single acre if left alone for a century would fill 13,000 acres. He ballyhooed this vine as the agricultural salvation of the south. He formed kudzu clubs and eventually persuaded 20,000 farmers to join up and plant the vine. But by the

fifties when the danger became clear, it was too late. The fate was sealed.

Kudzu, as noted before, is useful in holding erosional areas that are too steep to seed. Large mine spoil areas are also beautified by the addition of the kudzu planting. It is furthermore a legume, and can be considered a green manure crop adding nitrogen to the soil--thus aiding its fertility. In addition to the soil-holding on road cuts, kudzu can be used as an erosion prevention in the waterways if care is taken to remember the prolific growth of the plant.

Full sun to partial shade are the preferred light modes. It will not grow into a broadleaf forest with dense shade. Soils of medium fertility are the best even though poor soils will grow fairly well. Kudzu will grow in fairly acid to neutral soils that are well drained. It is not tolerant of salinity.

A biological description might be: A high climbing, exceedingly vigorous vine with twining stems (no tendrils or aerial holdfasts.) The plant is a long-lived perennial legume. It has large trifoliate leaves occasionally the leaflets are coarsely lobed. Trailing stems tack down at the nodes and produce crowns at these points. Flowers are violet in loose hanging racemous clusters. Hairy brown, bean-like seed pods are borne in the fall, but sparingly and mostly on supported vines. The plant is generally regarded as a pest especially because of its tree climbing habit.

GRAY'S MANUAL OF BOTANY describes the plant as;

> Calyx with the two upper lobes united. Keel ascending or arcuate at tip, about equally divided wings; standary is suborbicular or obovate. Stamens monadelphous, with the axillary free a base. Legume flattish, continuous or with internal partitions, the ovules numerous, seeds subordicular or transevesly ovoid, compressed. High climbing libneous to herbaceous plants with pinnately 3-foliate leaves, the leaflets entire to palmately lobed, the stipule herbaceous, stipels subulate. Racemes simple or compound, acillary, the purple flowers fastened at the nodes of the rachis, the small bracts deciduous, bracteoles tiny. Flowers have the rich fragrance of grapes. Flowers are reddish-purple. Introduced from Orient and now range is S. E. states north to N. Pa. Rarely flowers n. of Va. Late Aug.-Sept. Named for Swiss botanist, M. W. Puerari, 1765-1845.

The roots of kudzu are often intertwined allowing its good anti-erosional powers. From the Handbook of Biological Data, the following table shows the size of the roots compared to other plants.

Species	Roots Number				Roots Total Length cm.				Root Hairs Diameter			Root Hairs Length		
	I	II	III	IV	I	II	III	IV	I	II	III	I	II	III
Fescue (Festauca commutata)									3	13	12	400	400	350
Kudzu vine (Pueraria lobata)	1	54	755		9	380	225		12	12	11	150	140	140
Soybean (Glycine soja)	1	51	470	26	011	255	375	105	17	17	14	240	80	80
Composide dandelion (Taxaxacum offcinale)	1	180	900		30	720	360			7	7		130	130

Kudzu is a highly efficient nitrogen fixer, fixing at the rate of 49 kg/acre. The only legumes that do better are alfalfa--88 kg/acre, sweet clover-54 kg/acre, and lupine at 68 kg/acre. Data is from Handbook of Biological Data.

Reproduction is generally vegetative, the runners spreading and rooting at the nodes. These roots enlarge, become branched and fleshy, and form buds at the top, which when grown are called crowns.

Diseases affecting kudzu are a root rot fungus, Rhizoctonia solani mostly attacking small plants. Leaflets are commonly affected with halo blight caused by the bacterium Pseudomonas phasecolicola. The effect on kudzu is a small brown center, surrounded by a wide yellow band or halo. New leaves are so rapidly produced that the loss of a few of the older leaves is of little consequence. Another fungus Mycosphaerella puerariicola causes lesions on the leaves which are dark brown often with a yellowish margin. It is also susceptible to root node nematodes, but is seldom damaged by them. Kudzu is found all over the orient and has been naturalized through-out much of the United States Southland. In North Carolina the distribution was as is shown on the map as of 1963.

Kudzu is a summer plant, the leaves dropping at the first frost.

Many people have planted kudzu. The soil conservation has even printed directions on how to get the best yield. The directions follow:

Land Preparation: Start preparing the land in winter by deep plowing or disking. All land preparation should be on the contour.

Fertilizer: Use 100 lbs. of complete fertilizer such as 3-12-6 or 1-12-12 for each 800 feet of row. Apply fertilizer at time of planting. Scatter stable manure in a furrow along the side of the plants. The kudzu plants should not come in direct contact with the manure.

Spacing: The distances between rows may vary from 6 to 25 feet, depending upon how quickly complete ground cover is desired. The plants should be set 3-1/2 feet apart in the row. For the 25-foot rows, 500 plants will be required per acre and around 2,000 plants for the 6-foot rows.

Planting:

a. Hand Method: Dig holes deep enough to accommodate the plant roots. Set the plants so that the top buds are a little lower than the general ground surface. Pack soil firmly about the roots. Cover plant buds about one inch.

b. Furrow Method: Plant during late winter or early spring. Start by throwing 2 furrows together to form the row. (Locate rows on the contour on sloping land.) Place the plants, roots down in the furrow so they lean against the moldboard side of furrow and press dirt to

roots with foot. The tractor wheel may be used for this purpose after throwing furrow on plants. Throw a narrow furrow on the plants so that the tops of plants are slightly below the ground leve. Place fertilizer and/or manure in ths furrow and cover. Continue plowing until a wide flat bed is formed. On sandy land the plant should be planted deeper and the plant buds covered 3 inches.

Maintenance: Cultivate the first year. In case of wide rows, cultivated crops may be grown between the kudzu rows. Where cultivation is impractical, hand chopping will be needed. Topdress each year with around 800 lbs. of 0-14-14 fertilizer. Before growth starts the third year, disc the land. Close grazing or mowing may kill a good stand of kudzu.

This planting has led to the great explosion of kudzu and the feeble attempts to control the vine. Chemical controls have been applied as well as mechanical harvesting techniques. An old farmer told me that the only way to get rid of it is to keep goats on it for a period of two years. They will really eat it down, he said.

The following is the suggested chemical procedure: It is by W. M. Lewis, W. A. Skroch, and H. D. Coble.

Weed	Herbicide and Formulation	Amt of Formu-lation	Time of Application	Precaution & Remarks
Kudzu	2,4,5,-T (various) 4 lb/gal.	1 to 15 gal./ 100 gal. of water	May 15 to June 15	Ester from is more effective. Use ester only if no susceptible crops are near-by. Retreatment at 6 week intervals, will be necessary. 2,4-D and 2,4, 5-T mixtures will work but not quite as effectively. Do not use 2,4,5-T around the

LAB I

Purpose: To determine whether or not various weed killers are effective on cultivated kudzu (Pueraria lobata), and at what strengths.

Materials: Kudzu

vermiculite or soil

various weed killers (2,4, 5-T; 2,4-D)

planting pots

sprayer or atomizer

Procedure: Prepare a series of 15 pots with kudzu. Kudzu will root from the nodes. Grow these for two weeks in moderate sun, watering adequately. Divide your pots into three groups. One group (A) will be the control, one will be treated with 2,4-D (Group B) and (Group C) will be treated with 2,4,5-T. Use the following techniques:

Spray each of the plants in Group A according to the regime--

plant 1 spray 2 cc water

plant 2 spray 4 cc water

plant 3 spray 8 cc water

plant 4 spray 26 cc water

plant 5 spray 32 cc water

The plants in Group B and C will be treated in the

same manner except they will be sprayed with the pesticide specified for that group. For example, B-1 will get 2 cc of 2,4,-D B-2 will get 4 cc of 2,4-D, etc.

Solutions of the weed killers will be prepared at the recommended dosages as found on | Page # 11| of the unit.

Prepare a table of your data as follows:

PLANTS	GROUPS		
	A	B	C
1			
2			
3			
4			
5			

Analyze your results.

FOR FURTHER STUDY; Consider small doses over a longer period. One massive dose. Mechanical means instead of chemical.

LAB 2

Purpose: To investigate the percentage of vegetative growth from nodes and internodal areas.

Materials: Kudzu vine

Potting media (sand and vermiculite)

Procedure: Take a vine and cut 3 nodal and 3 internodal pieces. Make sure that each piece has one entire leaf (3 leaflets) if there are more, remove them. Place the cuttings into separate pots and water. Place in a shaded window so that the plant is in partial shade. Collect class data and work out the percentage growth from nodal and internodal pieces. Analyze using the Chi square or the T-test.

FOR FURTHER RESEARCH; USE ONLY LEAVES AND CHECK GERMINATION. TRY USING PLANT HORMONES TO SEE THE EFFECT. COLLECT SEEDS AND TRY TO GERMINATE THEM.